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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/046,422	11/07/2001	Matthew A. Purdy	2000.082700	3477
23720	7590	10/20/2004	EXAMINER	
WILLIAMS, MORGAN & AMERSON, P.C. 10333 RICHMOND, SUITE 1100 HOUSTON, TX 77042			SAGAR, KRIPA	
			ART UNIT	PAPER NUMBER
			1756	

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/046,422

Applicant(s)

PURDY ET AL.

Examiner

Kripa Sagar

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) 30-41 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Election/Restrictions***

1. Applicant's election of claims 1-29 in the reply filed on 7/29/04 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 1-29 are under consideration.

***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-29 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: the step of coating a photoresist layer on the antireflective coating (ARC).

Independent claims 1,10,16,20 recite the process steps of the invention wherein an ARC layer is formed and its optical properties are determined / measured prior to adjusting the exposure process parameters. Figs.3 and 4 of the instant invention and the specification suggest that the measurement includes the photoresist layer. This is also conventional practice. For the purposes of examination the presence of a photoresist layer is assumed at the time of the measurement.

The dependent claims are rejected for their dependence from the above claims.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-29 are rejected under 35 U.S.C. 102(e) as being anticipated by or in the alternative, under 35 U.S.C. 103(a) as obvious over US Pat.6368762 to Ling.

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Ling teaches the steps of the instant claims 1-29, in col.4;line.21-col.5;line.38. The steps comprise forming a process layer of an oxide on a wafer, forming a SiN layer, coating a photoresist layer, measuring the reflectance of the stack /SiN (fig.1) and adjusting the exposure level to the reflectivity of the layer. The measurement techniques are well known in the art and disclosed by Ling (5;5-20). Note that Ling uses the SiN layer as a mask (4;55); however the inherent ARC-property of the SiN layer is utilized by Ling as seen from the measurement of the reflectance of the layer. Ling does not teach [cl.29] averaging the reflectivity of a plurality of measurements; however this is a computational technique known in process control methods referred to by Ling (5;11-23).

7. Claims 1-4,6-11,13-15,17-23,25-29 are rejected under 35 U.S.C. 102(e) as anticipated by US Pat. 6482573 to Bhakta et al.

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

The process steps of the independent claims are illustrated in fig.6 and disclosed in detail (4;9-5;22). It teaches conventional inclusion of an ARC layer between the polysilicon and the photoresist (3;4-13). The averaging of the reflectivity is a well known process control technique as argued above with reference to Ling.

8. Claims 1-4,6-11,13-15,17-23,25-29 are rejected under 35 U.S.C. 102(e) as being anticipated by US Pat.6689519 to Brown et al.

Brown discloses a process control technique wherein the optical characteristics of a photoresist layer are determined and used to control (in a feedforward or feedback loop) exposure dose and post exposure bake (PEB) parameters (fig.1). The wafer stack obtained by the instant claimed process steps is disclosed (5;31-6;16). It teaches measurement of the optical properties of the stack by reflectometry, ellipsometry and the like (6;25-59). The optical properties may be measured after the ARC coating (10;54-62). The measurements are used to control the exposure dose or PEB process parameters (6;56-7;32). The averaging of the reflectivity is a well known process control technique as argued above with reference to Ling.

9. Claims 5,12,16,24 rejected under 35 U.S.C. 103(a) as being unpatentable over Bhakta or Brown above in view of US PG PUB 2002/0076843 to Ruelke et al.

The teachings of Bhakta and Brown have been discussed above. The ARCs of the instant claims 5, 12,16,24 are not specifically discussed in these disclosures.

Ruelke discloses conventional ARCs and an improved ARC with a barrier layer under a photoresist. The optical properties of the ARC are emphasized. Ruelke teaches that the refractive index, extinction coefficient and thickness can be adjusted over a wide range of values to suit the underlayer and the resist used (#0032). The variation in the exposure parameter is discussed (#0029).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the prior art ARCs taught by Ruelke in Bhakta's or Brown's controlled process with a reasonable expectation of successfully forming patterns with well-controlled CDs (critical dimensions) as taught by Ruelke (#0031).

### ***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Pat. 6479200 to Stirton teaches the ARCs of the instant claims; the process steps disclosed, differ from the instant process in that the reflectivity data from a wafer is used to control processing of subsequent wafers (fig.6)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kripa Sagar whose telephone number is 571-272-1392. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MH/ks

A handwritten signature in black ink, appearing to read "Mark E. Huff", with a long horizontal flourish extending to the right.

MARK E. HUFF  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700